

AMENDMENTS TO THE CLAIMS

This listing of the claims will replace all prior versions and listings of the claims in this application.

LISTING OF THE CLAIMS:

1 - 4. (Cancelled)

5. (Previously presented) Device for producing electricity from the heat produced in the core of at least one high temperature nuclear reactor comprising:

a primary circuit in which there circulates a first heat-exchange gas for cooling the core of the reactor, a gas turbine coupled to an electric generator via a shaft and a secondary circuit for circulation of a second heat-exchange gas on which the gas turbine is inserted;

at least one intermediate heat exchanger having a primary portion connected to the primary circuit of the nuclear reactor and a secondary portion connected to the secondary circuit and heating the second exchange gas on the basis of the heat produced in the reactor core by the first heat-exchange gas;

a tertiary circuit for circulation of water and steam, the tertiary circuit having at least one steam generator and at least one steam turbine, the intermediate exchanger and the gas turbine having characteristics adapted to the use of helium as a first heat-exchange gas and of a mixture of helium and nitrogen as a second heat-exchange gas;

the steam generator including a secondary portion connected to the tertiary steam circuit to receive water at the inlet and to provide steam at the outlet to the steam turbine and a primary portion connected to the secondary circuit to receive the second exchange gas after it issues from the gas turbine.

6 - 10. (Cancelled)

11. (Currently Amended) A device according to claim 5, further comprising a moderate temperature heat exchanger having a first portion ~~connection~~ connected to the secondary circuit for circulation of the second exchange fluid in the moderate temperature heat exchanger and a secondary portion in which there circulates a liquid such as water used in an auxiliary installation such as an urban heating circuit or a seawater desalination plant connected to a fourth circuit different from the primary, secondary and tertiary circuits.

12. (Withdrawn) Device according to claim 11, characterised in that the moderate temperature heat exchanger (30) is disposed on a conduit which bypasses a portion of the secondary circuit (9) and in that on the bypass conduit and on the portion of the secondary circuit on which the bypass conduit is placed there are disposed control valves (27a, 27b) for adjusting the throughput of the second exchange fluid in the portion of the secondary circuit and in the bypass conduit.

13. (Withdrawn) Device according to claim 5, characterised in that it comprises
at least two nuclear reactors each having a primary circuit in which a coolant gas circulates and
at least two intermediate heat exchangers (7a, 7b) each having a primary portion disposed on a respective primary circuit (6a, 6b) of a nuclear reactor (1a, 1b) for receiving the coolant gas from the nuclear reactor (1a, 1b) and a secondary portion disposed on a respective junction (9a, 9b) of a secondary circuit for receiving the second heat-exchange fluid,
a stop valve (21a, 21b) being disposed on each of the junctions (9a, 9b).

14. (Withdrawn) Device according to claim 13, characterised in that a pressure equalising valve (20a, 20b) is connected to each of the junctions (9a, 9b) of the secondary circuit and to each of the primary circuits (6a, 6b) of the nuclear reactors to maintain a pressure of the second exchange gas in the secondary portion of a respective heat exchanger (7a, 7b) substantially equal to a pressure of the coolant gas in the primary portion of the heat exchanger (7a, 7b).

15. (Withdrawn) Device for producing electricity from the heat produced in the core of at least one high temperature nuclear reactor comprising:

a primary circuit in which there circulates a first heat-exchange gas for cooling the core of the reactor, a gas turbine coupled to an electric generator via a shaft and a secondary circuit for circulation of a second heat-exchange gas on which the gas turbine is inserted;

at least one intermediate heat exchanger having a primary portion connected to the primary circuit of the nuclear reactor and a secondary portion connected to the secondary circuit and heating the second exchange gas on the basis of the heat produced in the reactor core by the first heat-exchange gas;

a tertiary circuit for circulation of water and steam, the tertiary circuit having at least one steam generator and at least one steam turbine, the intermediate exchanger and the gas turbine having characteristics adapted to the use of helium as a first heat-exchange gas and of a mixture of helium and nitrogen as a second heat-exchange gas;

the steam generator including a secondary portion connected to the tertiary steam circuit to receive water at the inlet and to provide steam at the outlet to the steam turbine and a primary portion connected to the secondary circuit to receive the second exchange gas after it issues from the gas turbine;

the tertiary circuit further including a first heater exchanger of which the secondary portion is connected to the outlet of the first steam turbine forming a high pressure turbine to receive wet steam and of which the outlet portion is selectively connected to a second steam turbine or medium pressure turbine;

the tertiary circuit further including a second heat exchanger having a second portion connected, via an inlet, to the outlet of the second medium pressure turbine to receive wet steam and, at the outlet, to an inlet portion of a third steam turbine or low pressure turbine of which the outlet portion is connected to the tertiary circuit on which a condenser is placed, each of the first and second heat exchanger heaters having a primary portion supplied with second exchange gas from bypasses of the secondary circuit to heat and dry the wet steam introduced at the inlet of the second portion of the heat exchanger heater; and

the tertiary circuit being in a closed circuit which enables the water recovered in the condenser to be conveyed to the inlet of the secondary portion of the steam generator.

16. (Withdrawn) Device for producing electricity from the heat produced in the core of at least one high temperature nuclear reactor comprising:

- a primary circuit in which there circulates a first heat-exchange gas for cooling the core of the reactor, a gas turbine coupled to an electric generator via a shaft and a secondary circuit for circulation of a second heat-exchange gas on which the gas turbine is inserted;

- at least one intermediate heat exchanger having a primary portion connected to the primary circuit of the nuclear reactor and a secondary portion connected to the secondary circuit and heating the second exchange gas on the basis of the heat produced in the reactor core by the first heat-exchange gas;

- a tertiary circuit for circulation of water and steam, the tertiary circuit having at least one steam generator and at least one steam turbine, the intermediate exchanger and the gas turbine having characteristics adapted to the use of helium as a first heat-exchange gas and of a mixture of helium and nitrogen as a second heat-exchange gas;

- the steam generator including a secondary portion connected to the tertiary steam circuit to receive water at the inlet and to provide steam at the outlet to the steam turbine and a primary portion connected to the secondary circuit to receive the second exchange gas after it issues from the gas turbine;

- the tertiary circuit further including a first heater exchanger of which the secondary portion is connected to the outlet of the first steam turbine forming a high pressure turbine to receive wet steam and of which the outlet portion is selectively connected to a second steam turbine or medium pressure turbine;

- a second heat exchanger having a second portion connected, via an inlet, to the outlet of the second medium pressure turbine to receive wet steam and, at the outlet, to an inlet portion of a third steam turbine or low pressure turbine of which the outlet portion is connected to the tertiary circuit on which a condenser is placed, each of the first and second heat exchanger heaters having a primary portion supplied with second exchange gas from bypasses of the secondary circuit to heat and dry the wet steam introduced at the inlet of the second portion of the heat exchanger heater;

the tertiary circuit being in a closed circuit which enables the water recovered in the condenser to be conveyed to the inlet of the secondary portion of the steam generator;

a counter-current heat exchanger being disposed in a portion of the tertiary circuit for returning condensed water to the inlet of the secondary portion of the steam generator so that a secondary portion of the heat exchanger receives, at the inlet, water originating from the condenser and, at the outlet, supplies heated water to the steam generator, and a primary portion in which there circulates the second heat-exchange gas recovered at the outlet of the primary portion of the steam generator and that of the heater exchangers.

17. (Previously presented) Device for producing electricity from the heat produced in the core of at least one high temperature nuclear reactor comprising:

a primary circuit in which there circulates a first heat-exchange gas for cooling the core of the reactor, a gas turbine coupled to an electric generator via a shaft and a secondary circuit for circulation of a second heat-exchange gas on which the gas turbine is inserted;

at least one intermediate heat exchanger having a primary portion connected to the primary circuit of the nuclear reactor and a secondary portion connected to the secondary circuit and heating the second exchange gas on the basis of the heat produced in the reactor core by the first heat-exchange gas;

a tertiary circuit for circulation of water and steam, the tertiary circuit having at least one steam generator and at least one steam turbine, the intermediate exchanger and the gas turbine having characteristics adapted to the use of helium as a first heat-exchange gas and of a mixture of helium and nitrogen as a second heat-exchange gas;

the steam generator including a secondary portion connected to the tertiary steam circuit to receive water at the inlet and to provide steam at the outlet to the steam turbine and a primary portion connected to the secondary circuit to receive the second exchange gas after it issues from the gas turbine; and

the intermediate heat exchanger being a plate exchanger.

18. (Previously presented) Device for producing electricity from the heat produced in the core of at least one high temperature nuclear reactor comprising:

a primary circuit in which there circulates a first heat-exchange gas for cooling the core of the reactor, a gas turbine coupled to an electric generator via a shaft and a secondary circuit for circulation of a second heat-exchange gas on which the gas turbine is inserted;

at least one intermediate heat exchanger having a primary portion connected to the primary circuit of the nuclear reactor and a secondary portion connected to the secondary circuit and heating the second exchange gas on the basis of the heat produced in the reactor core by the first heat-exchange gas;

a tertiary circuit for circulation of water and steam, the tertiary circuit having at least one steam generator and at least one steam turbine, the intermediate exchanger and the gas turbine having characteristics adapted to the use of helium as a first heat-exchange gas and of a mixture of helium and nitrogen as a second heat-exchange gas;

the steam generator including a secondary portion connected to the tertiary steam circuit to receive water at the inlet and to provide steam at the outlet to the steam turbine and a primary portion connected to the secondary circuit to receive the second exchange gas after it issues from the gas turbine;

the intermediate heat exchanger being a plate exchanger; and

the secondary circuit being entirely closed and including a compressor for recompressing the second exchange gas to a pressure which is substantially equal to the pressure of the first heat-exchange gas in the primary circuit of the nuclear reactor prior to its reintroduction at the inlet of the secondary portion of the intermediate exchanger.

19. (Previously presented) Device for producing electricity from the heat produced in the core of at least one high temperature nuclear reactor comprising:

a primary circuit in which there circulates a first heat-exchange gas for cooling the core of the reactor, a gas turbine coupled to an electric generator via a shaft and a secondary circuit for circulation of a second heat-exchange gas on which the gas turbine is inserted;

at least one intermediate heat exchanger having a primary portion connected to the primary circuit of the nuclear reactor and a secondary portion connected to the secondary circuit and heating the second exchange gas on the basis of the heat produced in the reactor core by the first heat-exchange gas;

a tertiary circuit for circulation of water and steam, the tertiary circuit having at least one steam generator and at least one steam turbine, the intermediate exchanger and the gas turbine having characteristics adapted to the use of helium as a first heat-exchange gas and of a mixture of helium and nitrogen as a second heat-exchange gas;

the steam generator including a secondary portion connected to the tertiary steam circuit to receive water at the inlet and to provide steam at the outlet to the steam turbine;

a primary portion connected to the secondary circuit to receive the second exchange gas after it issues from the gas turbine;

the intermediate heat exchanger being a plate exchanger;

the secondary circuit being entirely closed and including a compressor for recompressing the second exchange gas to a pressure which is substantially equal to the pressure of the first heat-exchange gas in the primary circuit of the nuclear reactor prior to its reintroduction at the inlet of the secondary portion of the intermediate exchanger; and

at least one pressure equalizing valve being connected to the primary circuit of the nuclear reactor as well as to a conduit of the secondary circuit which provides the connection between the outlet of the compressor and the inlet of the secondary portion of the heat exchanger so that the pressure of the first heat-exchange fluid in the primary circuit of the nuclear reactor and the pressure in the secondary portion of the at least one intermediate heat exchanger are continuously equal to one another.

20. (New) A device according to claim 5, wherein the secondary circuit includes a single compressor for recompressing the second exchange gas prior to its reintroduction at the inlet of the secondary portion of the intermediate exchanger.

21. (New) A device according to claim 5, wherein between an outlet of the primary portion of the steam generator and the inlet of the secondary portion of the intermediate exchanger, the second exchange gas is submitted to a compression by a ratio comprised between 1.5 and 3.